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RECORD OF ORAL HEARING

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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

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Ex Parte MASAYOSHI SAWAI

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Appeal 2009-005538
Application 10/669,644
Technology Center 2100

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Oral Hearing Held: January 14, 2010

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Before LEE E. BARRETT, JEAN R. HOMERE, and JAMES R. HUGHES, Administrative Patent Judges.

ON BEHALF OF THE APPELLANT:

CHIDAMBARAM S. IYER, ESQUIRE
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The above-entitled matter came on for hearing Thursday, January 14, 2010, commencing at 1:00 p.m., at the U.S. Patent and Trademark Office, 600 Dulany Street, Alexandria, Virginia, before Jack Becker, a Notary Public.

THE USHER: Good afternoon, Calendar No. 49, Appeal No. 2009-5538, Mr. Iyer.

MR. IYER: May it please the Court, Your Honor, I am Chid Iyer representing -- in this matter. May I begin?

JUDGE BARRETT: Sure.

MR. IYER: At the outset, I'd like to explain what this invention is all about. Essentially, it's a design of a wire harness. In, in systems like automobiles, for example, electrical components are connected using wires. However, because it's a fast moving system, there are some structural components that need to be considered when you design the wiring system. For example, it has to be rigid enough to withstand the movements and motions and stuff like that, so very strict structural limitation is imposed in these kinds of wiring systems. Wiring harnesses are designed to overcome problems that can result.

One of the problems that is identified is vibration. Now, it's well known that if the natural frequency of a physical system resonates with vibration that is imposed from outside, there is likely to be resonance, that means the amplitude will be far higher and it can structurally collapse or get damaged. Now -- so there's a design paradigm that needs to be evolved to handle these kinds of systems. So -- has decided in Claim 1 there are certain

assumptions that are made when the wiring system is laid out as a mathematical equation. The wires are considered to be elastic bodies, have circular cross-section, and more importantly, it's assumed that the entire system maintains linearity. Now the -- linearity has been discussed at length in the prosecution history as you may have seen. The Examiner interprets linearity in an incorrect way. Clearly, the Examiner interprets linearity to be that the wires are individual linear pieces of, you know, line segments attached to each other. Now linearity as usually mentioned is a mathematical concept of linearity that's well known in structural mechanics. Linearity as usually mentioned means that two properties are, are, you know, satisfied. One is that if two components are in the equation, they are additive. That means if -- let's say function fx, if fx+y needs to be computed, then you can compute it by doing fx+fy, that's one --

JUDGE HOMERE: Counselor , where is that described in the specification? Where is the -- does the Appellant describe linearity as argued by you in the Specification?

MR. IYER: Linearity is commonly known to be that, commonly known in the art. When you say that some system is linear, that's a common -- if, if that term is, you know -- for example, if you look it up in any mathematical dictionary or scientific dictionary or Wikipedia or any of these commonly available sources, linearity is well known to be a mathematical concept that has these two properties. So I'm going by the common, commonly accepted definition of linearity.

JUDGE BARRETT: Okay, and what was the second property?

MR. IYER: The second one is that it maintains proportionality in the sense that f of ax is the same as a times half of x. So that means if a variable is multiplied by a constant, the function itself gets multiplied by a constant.

JUDGE HOMERE: Counselor, then again I don't know why we are going down that road because, I mean, when you look at the claimed invention, the limitation at issue here is the linearity of the plurality of the elements being maintained. That's what the claim calls for.

MR. IYER: Right.

JUDGE HOMERE: So you have a plurality of these elements that are linear. I mean in laymen language what does that mean? I don't see anything pertaining to any mathematical concept here as argued by the Examiner. So how do we -- we believe that mathematical concepts with these two properties that you are referring to here when the -- first of all, the specification is silent on that, and the second of all, I would think that it would not be unreasonable to one of ordinary skill in the art to read this as if you have a plurality of these elements, if they follow the pattern of a line, they are linear. I have to take the Examiner's position.

MR. IYER: Let me, let me explain in two ways. One is first this Application is, is one that is completely following principles of linearity and structural mechanics. It's very clear that's the domain of this invention as -- this Application. In those domains, linearity has this mathematical definition. Now, secondly, if you look at, look at the figures in the Application, it's clear that they are not lines. So look at Figures 3-a, b, c.

JUDGE HOMERE: Okay, let's look at Figure 3-b.

MR. IYER: Yeah, 3-b --

JUDGE HOMERE: So what we have here we have -- beam elements. Okay, first of all, is it c-1 through c-7, are these beam elements?

MR. IYER: Yeah, they are beam elements.

JUDGE HOMERE: Okay, so if you have -- start at c-1 that's -- from the scope of c-2, and then c-2 is covered to c-3. So essentially you have a plurality of beam elements that are arranged along the line. Isn't that what's depicted in Figure 3-b?

MR. IYER: They're not arranged in a line. You can see they have a curved shape. Many of the lines are curved.

JUDGE HUGHES: Okay. I don't -- I guess we might not have a straight line, but you've got -- on one end of this Figure 3-c, you've got n-1, node 1, and on one end you've got n-8, and there is a line connecting them. That's a line any way you slice it, so I, I'm not following your argument. How is it, how is it that these are not in a line? They are not somehow following a line?

JUDGE HOMERE: So are you saying that if I take the line and I curve it a little bit, I don't --

MR. IYER: No, if, if -- when we say something is linear in, in the context of the shape of the line, it has to follow the equation $y = ax + c$.

JUDGE HUGHES: Okay, well, I --

MR. IYER: A curved line doesn't follow that -- and if you have a curved line, you have to have terms that are of higher order than x. It has to be x-squared, x-cubed, etc. So that argument, you know, does not hold good if you have a curved line. Even if you go by -- extend the logic that Your Honor mentioned, these are not $y = x + b$, that kind -- it is a quadratic or a

higher order equation if you have those -- look at the curved line. So even if that is true, the picture doesn't depict that.

JUDGE HUGHES: Right. Well -- but you're breaking this into segments or beam elements, c-1 through c-7.

MR. IYER: Right.

JUDGE HUGHES: Those are linear elements, are they not, according to --

MR. IYER: The c-2, the element c-2, if you go by the line argument, the line also has a mathematical designation as, as being a straight line as ax + b. Even if you go by that, c-2 --

JUDGE HUGHES: All right. Well, all right, we're going around in circles. I'm not understanding how a linear beam element -- how -- explain to me why -- how this distinguishes over the, the prior art that's cited.

MR. IYER: Okay. The requirement that beam elements -- the linearity of the beam elements have been maintained.

JUDGE HUGHES: All right.

MR. IYER: That's not there in the cited reference, Kodama.

JUDGE HUGHES: Okay.

MR. IYER: Now why it is important, why this feature is important for the mention, that should explain -- that should shed some light into, into why the Claim should be interpreted this way. If you look at pages 4 and 5 of the published application -- I am not sure if it is -- if you have a published application in front of you. There are, matrices, if you look at those large matrices, we go from equation 2 to equation 3, okay. And when we go from equation 2 to equation 3, there are some components of that large matrix that

are overlapping. Those overlapping components can -- only if we add those overlapping components, then we can achieve the objective of dimension, and it can be added only if it's linear.

JUDGE HUGHES: Okay.

MR. IYER: And the linear shown -- like it says, one of the requirements is that fx a + b is the same as fa + fb. Now, unless that property is satisfied, this kind of matrix transformation cannot be done. So to follow through with the -- the practicing --, you have to make sure that the mathematical concept of linearity is maintained by the beams.

JUDGE HUGHES: That's not -- you're maintaining that's not disclosed or taught by Kodama?

MR. IYER: Right.

JUDGE HUGHES: Well, what about the Neul reference?

MR. IYER: Neul reference talks about linearity, okay. That may -- the concept of linearity has been known for a very long time. It's a mathematical concept, but the, the application of linearity as an assumption to a wiring harness is not taught by the second reference, Neul reference. The Neul reference --

JUDGE HOMERE: Is it your position that -- well, you said that linearity with respect to beams that's -- right?

MR. IYER: Linearity with respect -- as a mathematical concept and with respect to beams, yeah.

JUDGE HOMERE: Oh, so if we are one with skill in the art, and we say that we have a plurality of beams that are linearly arranged, would that

person not understand it as having these two characteristics, these properties as described?

MR. IYER: Right, right. Right, it has to. That's all the definition --

JUDGE HOMERE: In other words, what we're saying is that well, Appellant did not invent arranging of plurality of beam elements in a linear fashion. That's something that -- I mean you are pretty much admitting on the record that is well known in the art.

MR. IYER: I'm admitting the concept of linearity was known.

JUDGE HOMERE: Okay.

MR. IYER: I am not admitting that the concept of linearity as applied to the beams are known. I'm not -- I haven't investigated enough.

JUDGE HOMERE: But you're not answering my question. My question is very simple. To one who knows how the concept of linearity works, if you say that a plurality of beams are arranged linearly, would that person not automatically understand that these two properties apply to those beams in order to arrange them in a linear fashion?

MR. IYER: When you -- right, when you say that linearity of beams -- a linearity for a set of beams is maintained, yeah, it will lead to that conclusion.

JUDGE HOMERE: Okay, that's what I -- okay.

MR. IYER: Okay.

JUDGE HUGHES: So I think I know where you're going, and I'd like to maybe clarify this even a little more. If I understand what you've just said correctly, you're saying that the idea of modeling something by taking a

number of segments, linear segments, beamed elements as you call them, and putting them together and modeling that object is well known?

MR. IYER: I'm not admitting that.

JUDGE HUGHES: You're not --

MR. IYER: No, I'm not admitting that.

JUDGE HUGHES: Okay --

MR. IYER: What I'm admitting is the concept of linearity and the mathematical definition of linearity is well known, okay. And the concept of taking beams together is well known. I'm not admitting that the two together are well known.

JUDGE HUGHES: Well, how does Neul -- let's get to the Neul reference then. How does Neul not teach that?

MR. IYER: Neul -- when the --

JUDGE HUGHES: Did Neul teach modeling of the Appellants, yes or no?

MR. IYER: Yes.

JUDGE HUGHES: It's a yes or no question. Yes. And it teaches modeling of linear, linear modeling of beam elements.

MR. IYER: No, that --

JUDGE HUGHES: It doesn't?

MR. IYER: No, it doesn't teach that.

JUDGE HUGHES: Okay.

MR. IYER: What it teaches is it takes one beam, when it talks about a beam, it talks about linear system, one beam, okay. To model the whole wire harness as a linear --

JUDGE HUGHES: Well, let's not go to the wire harness, let's talk about what Neul says. You're trying to distinguish Neul, so how does Neul not teach that if you take an object, a beam, and break it into sections, okay, beam elements, and model that, that's what I read Neul to teach. Maybe I'm misconstruing it, but you -- can you explain to me how it doesn't teach that? How, how is there a teaching away -- how is there -- how would one in the art not understand Neul to teach modeling beam elements? I, I -- you haven't answered that question.

MR. IYER: Okay, Neul discusses a single beam, okay, a single beam. It doesn't discuss a plurality of wire harness being split into a plurality of beams. It discusses --

JUDGE HOMERE: Okay, let me stop you right there. Let's turn to page 511, specifically, Figure 2. Got that? Figure 2, the portion -- section that states fundamentals. A mechanical structure is split into finer elements.

MR. IYER: Right --

JUDGE HOMERE: Hold on, hold on, and the behavior of the whole scheme is modeled into an example of these elements, and then showed in the figure is modeling using volume elements.

MR. IYER: Right.

JUDGE HOMERE: And it says modeling using special beam elements. So are you saying now that doesn't mean that we have a plurality of beam elements? We have one, one --

MR. IYER: I don't interpret it that way. The way I interpret it is it's a volume -- finite volume element, okay. And it applies full -- on the finite

volume element. This is not a plurality of beams connected to each other whose linearity is maintained.

JUDGE HOMERE: No, but it says you have a mechanical structure that is split into a plurality of beam elements.

MR. IYER: I don't interpret it that way. The way I look at it is it's --

JUDGE HOMERE: Well, I'm not interpreting, I'm reading from the text.

MR. IYER: Yeah, finite datum and the gain, finite datum and -- as known in finite datum and analysis is you're taking a concrete structure, okay, and, and splitting it up into miniscule volume elements. That is not, that is clearly not the same as taking a, a complete wire harness and splitting it up into finite beams, okay. Here, one beam is split into finite elements. And in the wire harness situation, we are taking a plurality of beams, okay, and we are maintaining linearity across the plurality of beams. So now as -- Patterson, the last reference, Patterson, both talk about center beam.

JUDGE HOMERE: But the claim refers to beam elements, you have a plurality of beam elements that you are adding. This is referring to a mechanical structure that is split into a plurality of beam elements. What is the difference here? Aren't we using the same terminology except one is saying well, you have a mechanical structure, the other one says well, you have a piece of wire. What is the difference? It is essentially splitting -- both of them are into a plurality of beam elements, so how are they different?

JUDGE HUGHES: I'd like to point out that you're talking about modeling of a mechanical system here, so you're taking a mathematical abstraction of a mechanical system. And I don't -- I'm with Judge Homere on this, I don't understand how there's a difference, and I -- from what you've told me so far, I'm not really catching what the difference is.

MR. IYER: If you look at the figures, you can understand the difference. The figures -- if you look at Figure 3, the fact of Figure 3, okay, there you can see clearly that you have c-1, c-2. The reason why they are marked c-1, c-2, c-3, etc. is that c-1 -- each of them is like a cantilever. So each of them -- each of those elements is created as a complete beam in this and they call it beam element. On the other hand, Neul is talking about portional equations for one single beam, and it uses finite elements within that beam. I accept that.

JUDGE HOMERE: I think we've got it -- so you have anything else besides that?

MR. IYER: These are the primary points that I wanted to bring across, that is, the concept of linearity. I just wanted to point out that the linearity is important in solving those equations, and I wanted to point out the section where it's clearly important that the additivity of the -- that I wanted to point out. And also the fact that the difference between creating a complete wiring harness as a plurality of beams, you know, and differentiating that with Neul and Patterson is what I wanted to -- if you do not have any other questions, thanks a lot. I really appreciate it, thank you.

JUDGE BARRETT: Do you have a card for the court reporter?

MR. IYER: Let me look at it. I hope I have one.

JUDGE BARRETT: Or you can, I guess -- if your name is spelled right here, he can use --

MR. IYER: C H I D, yes, Chid S. Iyer, yeah.

JUDGE BARRETT: Now, give him your contact information for your e-mail and phone number and everything.

MR. IYER: Okay, all right, I will.

Whereupon, the proceedings, at 1:20 p.m., were concluded.